

PREPLANT HERBICIDES

For Weed Control in Cotton

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Crop damage possibilities, only limited responses in cotton yields, and residue problems for subsequent crops, as evaluated in this report of San Joaquin Valley tests, indicate the need for caution in use of preplant herbicides for weed control.

WEEED CONTROL during the early growth of cotton has long been one of the major problems of California growers. Many of the herbicides used successfully in other parts of the country have proved to be either too toxic for use in California cotton or have failed to give control. Annual grasses represent the major weed problem during the early spring and summer. Broadleaf weeds that are also periodically troublesome include: pigweed, lambsquarters, annual morning-glory, and several weeds of the solanaceae family.

Last year three herbicides were evaluated for early weed control in extensive San Joaquin Valley tests. Most of the tests were preplant applications incorporated several ways including cross disking, harrowing, and rototilling. Experiments were conducted on Panoche clay loam, Hesperia fine sandy loam, Atwater sandy loam, Exeter loam, and Chino clay loam. Weed control ratings were made during the season, as well as observations of the cotton stand. At the end of the season, yields were recorded and analyzed. The cotton seed in these trials received standard fungicide seed treatment. Neither the

fungicide treatments made in the seed furrow nor the systemic-insecticide treatments were variables in these trials.

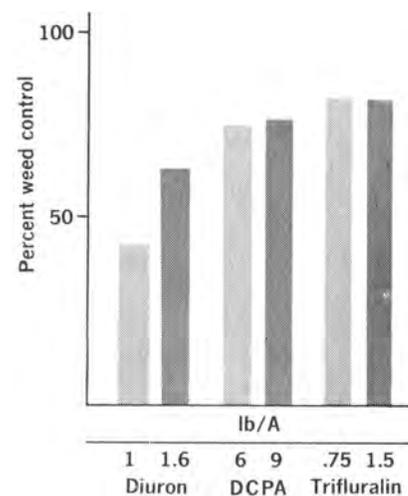
A summary of results clearly demonstrated satisfactory weed control with the use of the three herbicides (graph). Outstanding season-long weed control was obtained from rates as low as $\frac{3}{4}$ lb of trifluralin (Treflan) per acre. Satisfactory weed control was obtained from 9 lbs of DCPA (Dacthal) and 1.6 lbs of diuron (Karmex) in most trials. Cotton stand losses and chlorosis were apparent in a number of the fields treated with 1.6 lbs of diuron, as shown in the table. Trifluralin caused early stunting of cotton in 27% of the trials at 1.5 lbs per acre and cotton was set back with $\frac{3}{4}$ lb per acre applications in 15% of the trials. No significant loss of yield was recorded at the $\frac{3}{4}$ lb rate, but there were indications of yield reductions at 1.5 lbs per acre and higher, as shown in graph 2.

Although 9 lbs per acre of DCPA did not generally give as good weed control as did trifluralin at $\frac{3}{4}$ lb, DCPA was considerably less damaging to cotton. Even 12 lbs of DCPA per acre (which did not materially increase early weed control)

showed no stunting or other toxicity symptoms on cotton. The "apparent" increases in yield over the check would indicate responses from weed control, since most of the untreated checks in these tests were not weeded after layby. By the same reasoning, the yields from the relatively weed-free trifluralin plots, which appear to be about the same as the checks, would suggest possible yield reductions when compared with checks kept free of weeds throughout the season by hand weeding (graph 2).

Soil samples

After the cotton was harvested, soil samples from these trials were taken into the greenhouse and planted with cotton, cowpeas, annual morningglory, barley, sugar beets, milo, and barnyardgrass. These data, summarized in the table, clearly show herbicide residues in the soil. Residues from $\frac{3}{4}$ lb of trifluralin per acre were slightly toxic to barnyardgrass, and milo. Residues from 1.5 lbs of trifluralin caused damage and definite reduction of the growth of these plants. However, cotton and the other broadleaf plants did not appear to be affected. Resi-

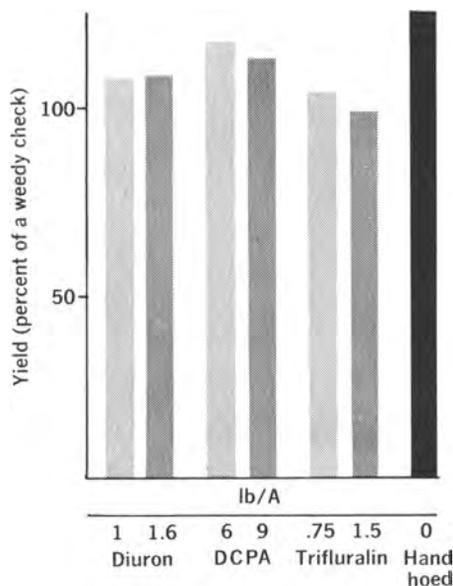


Graph 1. Average per cent weed control based on 0-10 ratings made two to three months after application. The results are averaged from six different trials (each replicated three times).

dues from DCPA applied at 9 lbs per acre likewise caused reduced growth of barley and barnyardgrass.

Residues from 1.6 lbs per acre rates of diuron caused considerable toxicity to all species except cotton and milo. Damage to sugar beets following diuron-treated cotton has been observed in the field, particularly where diuron was used at layby. The soil samples were taken from the undisturbed soil and probably represent the highest herbicide residues available eight months after treatment. After the soil is plowed, disked, and prepared for succeeding crops, this mixing of the previous season's herbicide would be expected to result in very little, if any, toxicity. However, the results of these greenhouse trials clearly indicate that residues remain, and further evaluations are necessary. A large number of tests are also planned for the 1964 cotton season to evaluate the early stunting and the possible effects on cotton yields.

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Graph 2. Average per cent yield based on a check where weeds were not controlled after layby. These data are a summary of six field trials except for the hand-hoed plots, which are an average of only two locations. The hand-hoed plots were kept free of weeds throughout the season.



Closeup photo of weedy, untreated cotton plot, above, shows contrast with herbicide treated, weed-free plot below.



Summary of phytotoxicity observations on cotton in the field during early growth and results of greenhouse soil residue eight months after herbicide application on several crops and weeds.

Herbicide	lb/A	Average per cent of trials showing toxicity							
		Field observations Cotton	Greenhouse soil residue effects on:						
			Sugar beets	Cow-peas	Morning-glory	Barley	Milo	Barnyard-grass	Cotton
Diuron	1.0	14	0	0	0	0	0	0	0
Diuron	1.6	44	100	50	100	100	0	50	0
Dacthal	6	0	0	0	0	0	0	0	0
Dacthal	9	0	0	0	0	20	0	40	0
Trifluralin	0.75	15	0	0	0	0	40	40	0
Trifluralin	1.5	27	0	0	0	0	100	100	0